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CHARACTERISATION OF SEED-OIL OF *CITRULLUS COLOCYNTHIS* (L.) SCHARD

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Abstract

Citrullus colocynthis (L.) Schard. is an important medicinal plant belonging to family Cucurbitaceae. The seeds of the plant are rich in oil which attracts many scientists to study its potential for the production of bio-fuel from the extracted oil. Taking this important aspect of this plant, the present research work was done emphasising on the study of its seed-oil. The percentage yield of oil from its seeds was found to be (18.66%). Characterising its potential on the basis of its physiochemical parameters such as acid value, saponification value, peroxide value and moisture content, it showed its acid value to be 4.445mgKOH, saponification value to be 177.97mgKOH and peroxide value to be 0.009 .TLC analysis of the crude oil from Citrullus colocynthis seed showed that the major constituents were mainly the triglycerides (Rf=0.66), free fatty acids (Rf=0.37), phospholipids (Rf=0.25) and sterols (Rf=0.16) along with other minor unidentified constituents.

Key Words: *Citrullus colocynthis, Cucurbitaceae, seed oil, acid value, saponification value, peroxide value, TLC, Rf value, triglycerides, free fatty acids, phospholipids, sterols.*

Introduction: *Citrullus colocynthis* (L.) Schard. is a desert plant with a good source of valuable oil (Dane et al., 2007). It is widely used in folk medicine for centuries and also is an energy source such as oilseed and biofuel (Uma and Sekar, 2014).*Citrullus colocynthis* (L.) Schard. commonly known as 'bitter apple' posses a wide range of pharmacological activity (Lakshmi et al.,2013). It is traditionally used as an abortifacient and to treat constipation &

oedema, bacterial infection, cancer and diabetic. *C.colocynthis* (L) Schard. having prominent free radical scavenging property, may be proved as a very good medicinal herb (Upadhyay,2011). *Citrullus colocynthis* (L.) Schard. has many important primary and secondary metabolites (Abdelrahim et al., 2013).

Oil extracted from *Citrullus colocynthis* (L.) Schrad. seeds are of great value as compared with conventional sunflower seed oil. Various studies shows that the non-conventional *Citrullus colocynthis* (L.) Schard. seed oil can supplement some of the conventional oil such as sunflower oil and can be used for food (Nehdi et al., 2013). Biodiesel can also be produced from the oil of *Citrullus colocynthis* (L.) Schard. (Chavan et al., 2014). So, to meet the increasing demand of the fossil fuel, the seed oil of *C.colocynthis* (L.) Schard. can be used as an alternative source for the production of lubricant and bio-fuel. Considering these facts, emphasis is given in the present study, to extract the seed oil from the experimental species, to study the physiochemical characters and the properties of the extracted seed-oil.

Materials and methods: *Citrullus colocynthis* (L.) Schard. dry seeds were collected from Churu district of Rajasthan. The dry seeds were kept in an air tight glass container under refrigeration at -20^0C to carry out the experiments. The husk of the seeds was removed and only the kernels were taken for quantification of lipid. Extraction of oil using hexane of seeds was carried out (Lakshmi et al., 2013).The extracted samples were kept in vials, wrapped properly and stored at 4^0C for oil characterisation. Thin layer chromatography of the extracted oil was taken by using TLC plates and the Rf values were calculated using Sawaya method (Sawaya et al., 1983). Acid value, saponification value and the peroxide value of the oil were determined by using the methods by Sadasivam and Manickam, 2008.

Results and discussion: The oil extract from the seed of bitterapple was found to be (18.66%).Saponification value indicates the average molecular weight of oil (Booth and Wickens, 1988). In the present investigation, *Citrullus colocynthis* (L.) Schard. oil showed high saponification value, i.e. 177.97 mg KOH/g which implied greater proportion of fatty acids. The values compared favourably with the saponification value of palm oil (196 – 205 mgKOH/g), olive oil (185 - 196 mgKOH/g), soyabean oil (193 mgKOH/g) and linseed oil (193 - 195 mgKOH/g) (Folkard and Sutherland, 1996). The high saponification value of *Citrullus colocynthis* (L.) Schard. suggests that the oils could be good for soap making and in the manufacture for lather shaving cream (Eka, 1980 ; Nzikou et al., 2007). The present investigation also confirmed the high percentage acid value 4.445 mg KOH/g %. The acid value represents free fatty acid content due to enzymatic activity and this implies that the oils are not rancid. The peroxide values of *Citrullus colocynthis* (L.) Schard. seed oils were

obtained to be 0.099. The peroxide value is the measure of oxidative rancidity of oil (Ekpa and Ekpa, 1996). The peroxide value was low and is pointer to the fact that the oils may not be easily susceptible to deterioration. Oxidative rancidity is the addition of oxygen across the double bonds in unsaturated fatty acids in the presence of enzyme or certain chemical compounds (Guthrie et al., 1954; Oyenuga, 1998). The odour and flavour associated with rancidity are due to liberation of short chain carboxylic acids. High peroxide values are associated with higher rate of rancidity. The low peroxide values of the oils indicate that they are less liable to oxidative rancidity at room temperature (Odoemelam, 2005). These oils are fresh because the content peroxide lower than 10 meqO 2/kg and oil grow rancid when the content peroxide lies between 22 and 40.0 meqO 2/kg (Pearson, 1976). In the contrary, oils having high percentage of peroxide are unstable and grow rancid easily (an unpleasant odour). These oils are saturated therefore there is no risk of formation of peroxides (Ekpa and Ekpa, 1996).

Table 1: Chemical characteristics of the extracted oil of *Citrullus colocynthis (L.)* Schard. seed

Assay	Value
Acid Value	4.445mg of KOH
Saponification value	177.97mg of KOH
Peroxide value	0.099mg of KOH

TLC analysis of the crude oil from *Citrullus colocynthis (L.) Schard.* seed showed that the major constituents were mainly the triglycerides (Rf=0.66),Free fatty acids(Rf= 0.37), phospholipids (Rf = 0.25) and sterols (Rf = 0.16) in addition to other minor unidentified constituents.

Table 2: Rf value of the extracted seed oil.

(Petroleum ether-diethyl ether-acetic acid in the ratio of 75:24.5:0.5 v/v)

Spot	Spot distance (cm)	Rf
1	0.9	0.125
2	1.2	0.16
3	1.8	0.25
4	2.4	0.33
5	2.7	0.37
6	3.6	0.50
7	3.9	0.54
8	4.4	0.61
9	4.8	0.66
10	6.4	0.88
11	6.7	0.93

Conclusion: In recent times, focus on plant research has increased over the entire world and evidence has collected to show immense potential of medicinal plants used in various

traditional systems. *Citrullus colocynthis* (L.) Schard. has great economic and therapeutic importance due to the presence of various active ingredients in different parts of this herb. It produce high oil content seed for which it is economical and almost all parts of this plant have a lot of medicinal values. Seeds of *Citrullus colocynthis* (L.) Schrad. has high nutritional quality (Charment et al.,1998). *Citrullus colocynthis* (L.) Schrad. seeds contained protein which are rich in methionine and cystine ,oil rich in Oleic, Linoleic, Linolenic acid, ash, crude fiber, potassium, phosphorous and iron (Sawaya et al.,1986). Further investigations on the qualitative and quantitative analysis of different nutrient constituents of this seed and their authentication as curative medicines can revolutionise and open new vista in medical science.

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